

PURE¹⁵⁰_{PRO}

[Previously marketed as "PF PRO"]

- **heavy duty**
- **low odour**
- **fire rated**
- **pure epoxy anchoring adhesive**
- **low VOC content**



Certified to
NSF/ANSI 61



Powers offers the widest range of mechanical and adhesive fasteners in the market place. Powers products cover the full traditional anchoring range while specialising in innovative products that provide the architect, engineer and end user with aesthetic, high performance, labour saving fastening solutions.

For fast technical advice, free samples and free on site demonstrations, visit our website www.powers.com.au

Other Powers adhesive systems



V12
High performance
Economical
Versatile
Vinyl ester resin



AC100® PRO
High performance.
Fast curing
Styrene free



AC100e
Standard caulking gun
Easy to apply
Environmentally friendly



KF2
Economical
Easy to apply

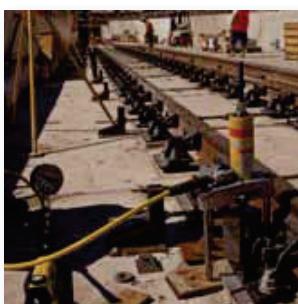
Support



Training Facility
Melbourne



In-house Product &
Application Testing
Service
Melbourne



National on Site
Anchor Testing
Service



National On Site
Service
Powers Training
Vehicles (PTV)

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PURE150-PRO



Introduction

PURE150-PRO epoxy injection adhesive is a new and improved two component structural epoxy packaged in a specially designed cartridge. The cartridge is made from an engineered plastic and is used with either a manual or pneumatically operated injection tool. The new epoxy is a low odour, premium, high strength pure epoxy, which contains low levels of volatile organic compounds (VOCs) and has a proven track record. The mixed adhesive is now a red colour, for easy inspection on site. PURE150-PRO has longer gel/working time and easier handling (extrudes better) when compared to Power-Fast®PLUS. PURE150-PRO epoxy injection adhesive is designed for use in anchoring threaded rod, bolts, and reinforcing bars into concrete and other solid base materials. PURE150-PRO is fire rated and details of this test program are available in the fire resistance section of this manual. In addition to anchoring applications, PURE150-PRO epoxy injection adhesive can be used for bonding steel and cured concrete to cured concrete. It can also be used for pick proofing applications and for surface sealing cracks in concrete.

Product specification data

PURE150-PRO Cartridge

The design of the PURE150-PRO cartridge eliminates the leakage and dispensing problems often found with other systems. Supplied in a 385ml or 585ml capacity, each cartridge is manufactured in a side by side configuration using two parallel tubes. One tube contains the Component A - Base Resin while the other tube contains the Component B - Hardener. The tubes are separated to keep the components out of contact until they are ready to be dispensed. Each cartridge is formed from an engineered plastic using a special high tolerance molding process. At the front end of each cartridge is a reinforced retention cap and a threaded manifold. A set of plastic pushers is inserted into the rear of each tube to pressurise the epoxy during dispensing. This provides the user with a cartridge which is easy to dispense, yet durable.



PURE150-PRO Mixing nozzles

To ensure complete and proper mixing of the epoxy components, the PURE150-PRO system use a static mixing nozzle. This reduces the possibility of mixing errors which are common with hand mixed pourable grout materials. The mixing nozzles have been designed with a unique tapered extension tip that allows for easy assembly of the extension nozzle. The assembled nozzle system can be used to inject epoxy into most anchor hole sizes. Each nozzle contains a series of stationary components called mixing elements. The elements are motionless and remain in a fixed or static position as the epoxy components are pumped through the nozzle. As the components are pumped through the nozzle, they are progressively divided and recombined by the stationary mixing elements to ensure precise automatic mixing of the components.

PART NO	DESCRIPTION	QUANTITY
PFPN	Mixing nozzle for PF PRO, includes extension nozzle	10

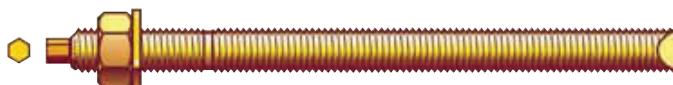
Cartridge system selection guide

PURE150-PRO Cartridge

PART NO	DESCRIPTION	QUANTITY
PURE150PRO-385	385ml Cartridge + 2 mixing nozzles	1
PURE150PRO-585	585ml Cartridge + 2 mixing nozzles	1

Threaded Rod (STM™ studs)

Powers Fasteners supplies a range of adhesive anchor studs (STM™) for use based on standard embedment depth applications. For alternate embedment depths, studs should be cut to specified size as per application requirements. Studs not sourced from Powers Fasteners must be from a reputable source and material properties should be verified as being compliant to specified material property grades i.e. class 5.8. Powers Fasteners supplies studs in stainless steel, galvanised steel and zinc plated steel, environmental factors and application factors should be considered carefully prior to selecting the correct stud.



STM™ – Chisel Point Stud 5.8

Carbon Steel Yellow Passivated		Ø	mm	mm	mm	QTY	QTY
PART NO.	DESCRIPTION	mm	mm	mm	QTY	QTY	
STM8110	8 x 110 with Nut and Washer	10	80	17	10	200	
STM10130	10 x 130 with Nut and Washer	12	90	28	10	200	
STM12160	12 x 160 with Nut and Washer	14	110	36	10	100	
STM16190	16 x 190 with Nut and Washer	18	125	42	10	50	
STM20260	20 x 260 with Nut and Washer	24	170	72	5	25	
STM24300	24 x 300 with Nut and Washer	28	210	66	5	20	



STM™ – Chisel Point Stud Galvanised Class 5.8

Carbon Steel Galvanised		Ø	mm	mm	mm	QTY	QTY
PART NO.	DESCRIPTION	mm	mm	mm	QTY	QTY	
STM8110G	8 x 110 with Nut and Washer	10	80	17	10	200	
STM10130G	10 x 130 with Nut and Washer	12	90	28	10	200	
STM12160G	12 x 160 with Nut and Washer	14	110	36	10	100	
STM16190G	16 x 190 with Nut and Washer	18	125	42	10	50	
STM20260G	20 x 260 with Nut and Washer	24	170	72	5	25	
STM24300G	24 x 300 with Nut and Washer	28	210	66	5	20	



STM™ – Chisel Point Stud 316 Stainless Steel

316 Stainless Steel		Ø	FL	LP	QTY	QTY
PART NO.	DESCRIPTION	mm	mm	mm	QTY	QTY
STM8110SS	8 x 110 with Nut and Washer	10	80	17	10	200
STM10130SS	10 x 130 with Nut and Washer	12	90	28	10	200
STM12160SS	12 x 160 with Nut and Washer	14	110	36	10	100
STM16190SS	16 x 190 with Nut and Washer	18	125	42	10	50
STM20260SS	20 x 260 with Nut and Washer	24	170	72	5	25
STM24300SS	24 x 300 with Nut and Washer	28	210	66	5	20

Manual injection tools



CG585

The CG 585 manual injection tool is designed with a pump style drive mechanism which has a high pump ratio to provide fast dispensing. The base unit and the handle assembly is manufactured from a precision steel casting for long life. A specially designed wear compensation mechanism ensures consistent pumping over the life of the tool. The tool is designed for use with the 385ml and 585ml cartridge only.



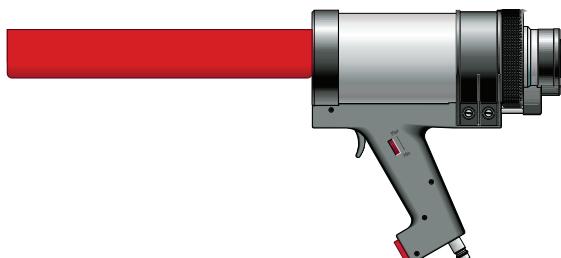
CGPRO-4

The Multi-PRO (CG PRO-4) manual injection tool is designed with a pump style drive mechanism which has a high pump ratio to provide fast dispensing. The base unit is a unique design which allows for the dispensing of different cartridge sizes consisting of different component ratios. The CG PRO-4 will dispense the 385ml (3:1) cartridge, the 585ml (3:1) cartridge, 380ml (10:1) cartridge, and 300ml (10:1) cartridge. CG PRO-4 is ideal for those who use the entire Powers adhesive range.

PART NO	DESCRIPTION	QTY
CG585	Dispensing gun for 385ml and 585ml cartridge	1
CGPRO-4	Dispensing gun for all Powers adhesives	1

Pneumatic injection tool

The pneumatic injection tool is designed for large jobs. The main cylinder is formed using top quality aluminum to provide a lightweight, durable tool. The dispensing trigger is designed to provide instant pressure relief from the cartridge which reduces waste.



PART NO	DESCRIPTION	QUANTITY
CGPN585	Pneumatic Dispensing gun for 385ml and 585ml cartridge	1

Maximum Operating Pressure - 110 psi

Normal Operating Range - 80 to 100 psi

Maximum Free Air Required - 1 CFM based on average use

Battery injection tool

The Battery Injection Tool is designed for large jobs. It consists of a reinforced steel sheet cradle and has a trigger system which provides instant pressure relief for the cartridge which reduces waste. Designed for the 385-585ml (3:1) coaxial cartridge, the Battery Injection Tool works on Lithium Ion technology providing long lasting consistent performance.



PART NO	DESCRIPTION	QUANTITY
CGB-585	Battery Injection Tool 385-585ml (2 x battery)	1
	<i>Charge time: 60 minutes</i>	<i>Drive system: 5000N (500kg)</i>
	<i>Extrusion rate: 120 – 240 ml / min.</i>	<i>Tool Weight: 3.3 kg</i>
	<i>Tool Length: 470mm</i>	

For use in overhead applications (Ref. Adhesive Anchoring Systems Design Manual)

PART NO	DESCRIPTION	DRILL Ø mm	STUD Ø mm	QUANTITY
RC8	8mm Retaining Cap	10	8	10
RC10	10mm Retaining Cap	12	10	10
RC12	12mm Retaining Cap	14	12	10
RC16	16mm Retaining Cap	18	16	10
RC20	20mm Retaining Cap	24	20	10

**PURE150-PRO material properties**

The PURE150-PRO epoxy is an amine based material. The benefits of using an amine based material include no foul odour, better resistance to moisture, and better chemical resistance. The properties listed in this section apply to the PURE150-PRO epoxy injection adhesive. The performance criteria for use as an anchoring system for threaded rod and reinforcing bars is described in the sections that follow.

Shelf life	24 months
Storage conditions	Store dry at 5° to 25° C.
Colour	Component A – Light beige Component B – Red Mixed epoxy – Red
Mixing ratio	3 to 1
Consistency	Smooth, non sag paste
Compressive strength	145 MPa
Modulus of Elasticity	7356 MPa
Bending strength	63.0 MPa

PURE150-PRO Epoxy injection gel setting time

The setting times listed for the PURE150-PRO epoxy vary according to the volume of epoxy used and the base material temperature. The working time is the maximum time during which the epoxy can be dispensed before it begins to set. The full curing time is the minimum time required for the epoxy to reach its published physical properties.

BASE MATERIAL TEMP. (C)	MAXIMUM WORKING TIME (MINUTES)	FULL CURING TIME (HOURS)
0	180	50
10	120	24
20	30	10
30	20	6
40	12	4

NOTE: For wet concrete curing times must be doubled

PURE150-PRO Quality control procedures

PURE150-PRO epoxy injection adhesive is packaged individually. Each cartridge contains a manufacture date which provides traceability of the components back to the original manufacturing batch. Every batch of material is subjected to extensive physical and chemical property testing during manufacture. Each combination of base resin and hardener material batches is tested as an installed anchor to ensure that the proper bond strength is developed. These procedures ensure consistent, top quality performance to the specifier and the installer of the PURE150-PRO epoxy injection adhesive.

VOC Content certification

Powers PURE150-PRO Injection System has been tested in accordance with SCAQMD Method 304-91 Determination of Volatile Organic Compounds (VOC) in various materials as referenced by South Coast Air Quality Management Division (SCAQMD) Rule 1168.

The VOC content of Powers PURE150-PRO has been determined and the product conforms to the Green Building Council of Australia specification as outlined under Green Star Office Design V2 IEQ-13, V1.1 IEQ-11 And V3 IEQ-13. Copy of test certificate available on request.



Resistance of PURE150-PRO epoxy to chemicals

The resistance of the cured PURE150-PRO epoxy to various chemicals was determined by laying moulded samples of the resin in the respective chemical agents. The samples were subjected to a bending strength test before and after a 12 month exposure to the chemicals. The epoxy was rated as resistant if there was no visible deterioration and less than 25% reduction in bending strength. This exposure is extreme. Under normal installation conditions, the epoxy is exposed to the chemical agents only at the surface of the concrete around the top of the anchor hole.

CHEMICAL AGENT	CONCENTRATION	RESISTANT	NOT RESISTANT
Acetic Acid	40		◆
Acetone	10		◆
Ammonia	5	●	
Aniline	100		◆
Beer	100	●	
Benzine	100	●	
Benzole	100		◆
Boric acid, aqueous solution		●	
Calcium carbonate, suspended in water	All	●	
Calcium chloride, suspended in water		●	
Calcium hydroxide, suspended in water		●	
Carbon tetrachloride	100	●	
Caustic soda solution	40		◆
Citric acid	All	●	
Chlorine	All	●	
Diesel oil	100	●	
Ethyl alcohol, aqueous solution	50		◆
Formaldehyde	30	●	
Formic Acid	100		◆
Formic Acid	10	●	
Freon		●	
Fuel oil		●	
Glycol (Ethylene Glycol)		●	
Hydrogen peroxide	30		◆
Hydrochloric acid	Conc.	●	
Isopropyl alcohol	100		◆
Lactic acid		●	
Laitance		●	
Linseed oil	100	●	
Lubricating oil	100	●	
Magnesium chloride, aqueous solution	All	●	
Methanol	100		◆
Motor Oil (SAE 20 W-50)	100	●	
Nitric acid	30		◆
Nitric acid	10	●	
Oleic acid	100	●	
Perchloroethylene	100	●	
Petroleum	100	●	
Phenol, aqueous solution	8		◆
Phosphoric acid	85	●	
Phosphoric acid	10	●	
Potash Lye (Potassium Hydroxide, 10% and 40% solutions)		●	
Potassium carbonate, aqueous solution	All	●	
Potassium Chlorite, aqueous solution	All	●	
Potassium nitrate, aqueous solution	All	●	
Premium gasoline	100	●	
Sodium carbonate, aqueous solution	All	●	
Sodium chloride, aqueous solution	All	●	
Sodium phosphate, aqueous solution	All	●	
Sodium silicate	All	●	
Sulfuric acid	30		◆
Tartaric acid	All	●	
Tetrachoraethylene	100	●	
Toluene			◆
Turpentine	100	●	
Trichloraethylene	100		◆

Performance data

Spacing and Edge Distance

For anchor spacing, edge distance and combined loading information, please refer to Section 8 of the Specification Guide. For critical spacing and edge distance $R_s=1.00$ and $R_{e(t\&s)}=1.00$.

Working stress design

Allowable working loads are based on the lesser of the allowable bond strength and allowable steel strength.

Tension

ANCHOR SIZE mm	DRILL SIZE mm	EMBED. DEPTH mm	TORQUE RANGE Nm	ALLOWABLE BOND STRENGTH CONCRETE - TENSION			ALLOWABLE STEEL STRENGTH (min)		
				15MPa kN	32MPa kN	40MPa kN	TENSION kN Class 5.8	TENSION kN Class 8.8	TENSION kN 316 S/S (A4-50)
M8	10	40	10	3.6	5.1	6.5	7.6	11.7	8.1
		60		5.7	7.7	9.6			
		80		7.9	9.5	12.2			
M10	12	40	20	4.4	6.4	7.4	12.1	18.6	12.8
		60		6.6	9.9	11.5			
		90		11.1	13.9	17.1			
		115		13.7	16.6	20.1			
M12	14	50	40	6.8	10.6	11.6	17.5	27.0	18.6
		75		10.9	15.4	17.8			
		110		16.0	22.7	25.9			
		150		21.8	28.9	34.2			
M16	18	65	80	11.4	13.3	17.2	32.7	50.0	34.5
		95		17.0	22.8	26.4			
		125		23.1	32.1	37.1			
		190		35.5	46.5	56.8			
M20	24	75	120	13.2	15.2	18.5	51.0	81.2	53.9
		115		23.8	26.8	35.1			
		170		38.6	54.6	59.7			
		230		52.4	65.3	76.6			
M24	28	100	160	27.4	34.1	41.4	73.4	117.2	77.9
		150		40.9	51.4	56.8			
		210		56.3	77.4	88.5			
		300		87.3	118.4	136.5			
M30	35	125	180	37.0	52.3	60.4	116.7	186.4	123.4
		190		56.0	79.6	91.9			
		270		79.9	113.1	130.6			
		380		123.8	175.2	202.4			
M36	40	140	200	47.3	67.0	77.4	169.9	271.2	179.7
		210		71.0	100.6	116.0			
		330		112.6	159.6	184.3			
		420		150.0	212.2	245.0			

Incorporated Safety Factors (Tension and shear):
 Allowable bond strength (concrete) $f_{sc} = 3$
 Allowable steel strength $f_{ss} = 2.5$

Shear

Incorporated Safety Factors (Tension and shear):
 Allowable bond strength (concrete) $f_{sc} = 3$
 Allowable steel strength $f_{ss} = 2.5$

NOTE:
 The allowable Working Load used should be the lesser of the bond or steel strength.

ANCHOR SIZE mm	DRILL SIZE mm	EMBED. DEPTH mm	TORQUE RANGE Nm	ALLOWABLE BOND STRENGTH CONCRETE - SHEAR			ALLOWABLE STEEL STRENGTH (min)		
				15MPa kN	32MPa kN	40MPa kN	SHEAR kN Class 5.8	SHEAR kN Class 8.8	SHEAR kN 316 S/S (A4-50)
M8	10	40	10	5.6			4.2	6.5	5.0
M10	12	40	20	7.7			6.7	10.4	7.9
M12	14	50	40		13.2		9.8	15.1	11.5
M16	18	65	80	20.9			18.6	28.6	21.4
M20	24	75	120	34.7			29.0	46.3	33.4
M24	28	100	160	63.0			41.8	66.7	48.3
M30	35	125	180	99.7			66.9	115.5	76.5
M36	40	140	200	116.5			97.9	168.2	111.4

Limit state design

Anchor design capacities are based on the lesser of the design capacity concrete and design steel capacity

ANCHOR SIZE mm	DRILL SIZE mm	EMBED. DEPTH mm	TORQUE RANGE Nm	DESIGN CAPACITY - CONCRETE			DESIGN STEEL CAPACITY		
				15MPa ϕN_A kN	32MPa ϕN_A kN	40MPa ϕN_A kN	Class 5.8 ϕN_t kN	Class 8.8 ϕN_t kN	(A4-50) 316ss ϕN_t kN
M8	10	40	10	6.4	9.3	11.6	15.2	23.4	16.2
		60		10.2	13.8	17.3			
		80		14.2	17.1	22.0			
M10	12	40	20	7.9	11.4	12.4	24.1	37.1	25.6
		60		11.9	17.8	20.7			
		90		20.0	25.0	30.8			
		115		24.7	29.9	36.1			
M12	14	50	40	12.3	19.0	21.0	35.1	53.9	37.2
		75		19.6	27.8	32.1			
		110		28.8	40.9	46.6			
		150		39.3	52.0	61.5			
M16	18	65	80	20.5	24.0	30.9	65.3	100.0	69.0
		95		30.7	41.1	47.4			
		125		41.6	57.8	66.8			
		190		64.0	83.6	102.2			
M20	24	75	120	23.8	27.3	33.3	101.9	162.4	107.8
		115		42.8	48.2	63.2			
		170		69.5	98.3	107.4			
		230		94.3	117.6	137.8			
M24	28	100	160	49.2	61.3	74.5	146.8	234.4	155.8
		150		73.7	92.4	102.2			
		210		101.3	139.3	159.3			
		300		157.1	213.1	245.7			
M30	35	125	180	66.5	94.2	108.6	233.4	372.8	246.8
		190		100.9	143.2	165.5			
		270		143.8	203.6	235.1			
		380		222.9	315.3	364.2			
M36	40	140	200	85.1	120.5	139.3	339.9	542.4	359.4
		210		127.9	181.0	208.9			
		330		202.7	287.3	331.7			
		420		270.0	381.9	440.9			

Anchor Design Tension Capacities

ANCHOR SIZE mm	DRILL SIZE mm	EMBED. DEPTH mm	TORQUE RANGE Nm	DESIGN CAPACITY - CONCRETE			DESIGN STEEL CAPACITY		
				15MPa / 32MPa / 40MPa ϕV_A kN	Class 5.8 ϕV_t kN	Class 8.8 ϕV_t kN	(A4-50) 316ss ϕV_t kN		
M8	10	25	10	10.1	8.5	13.0	10.1		
M10	12	40	20	13.9	13.5	20.8	15.9		
M12	14	50	40	23.8	19.7	30.2	23.1		
M16	18	65	80	37.6	37.1	57.1	42.8		
M20	24	75	120	62.5	58.0	92.6	66.8		
M24	28	100	160	113.4	83.6	133.4	96.6		
M30	35	125	180	179.5	133.9	231.0	153.0		
M36	40	140	200	209.7	195.8	336.4	222.8		

Anchor Design Shear Capacities

NOTE:

1. Linear interpolation is permitted between published embedment depths and concrete compressive strengths.
2. Performance data is based on critical spacing and edge distance design criteria.
3. For anchor spacing, edge distance and combined loading information, please refer to Section 8 of the Specification Guide. For critical spacing and edge distance $R_s=1.00$ and $R_{e(t \& s)}=1.00$.

Design for strength limit state

Design is based on the lesser of the concrete and steel capacities.

$$\begin{aligned} N^* &\leq \phi N_{A,tf} && \text{Tension} \\ V^* &\leq \phi V_{A,f} && \text{Shear} \\ (N^*/\phi N_{A,tf})^{5/3} + (V^*/\phi V_{A,f})^{5/3} &\leq 1 && \text{Combined loading} \end{aligned}$$

Where:

$$\begin{aligned} N^* &= \text{Design tension force (kN)} \\ V^* &= \text{Design shear force (kN)} \\ \phi N_{A,tf} &= \text{Anchor design tension capacity (kN)} \\ \phi V_{A,f} &= \text{Anchor design shear capacity (kN)} \end{aligned}$$

Concrete:

$$\begin{aligned} N_A &= \text{Characteristic ultimate tension load capacity (kN)} \\ V_A &= \text{Characteristic ultimate shear load capacity (kN)} \\ \phi &= 0.6 \text{ [Strength reduction factor] – tension and shear} \end{aligned}$$

Steel:

$$\begin{aligned} N_{tf} &= \text{Nominal tension capacity of steel (kN)} \\ V_f &= \text{Nominal shear capacity of steel (kN)} \\ \phi &= 0.8 \text{ [Capacity factor – tension and shear]} \end{aligned}$$

Reinforcing bar limit state design data

BAR Ø mm	DRILL Ø mm	ANCHOR DESIGN TENSION CAPACITIES (CONCRETE / BOND) (ϕN_A)										BAR DEVELOPMENT STRENGTH (kN) (F_{sy})	DEVELOPMENT LENGTH $L_{sy,t}$
N10	12	24.6 30.8 36.9 46.0										39.3	128
N12	15	30.8 38.5 46.1 57.6 69.1										56.5	147
N16	20	51.3 57.7 72.1 86.5 100.5 114.9										100.5	210
N20	25	58.1 69.7 87.1 104.5 122.0 139.4 157.0 174.3										157.0	270
N24	30	86.5 108.2 129.8 151.4 173.0 194.7 216.3 251.4										226.0	314
N28	35	100.9 126.2 151.4 176.6 201.9 227.1 252.4 294.4 335.2										308.0	366
N32	40	139.4 167.3 195.2 223.0 250.9 278.8 325.3 371.7 463.7										402.0	433
N36	44	149.1 178.9 208.7 238.6 268.4 298.2 347.9 397.6 497.0 596.7										510.0	513
N40	50	249.9 281.2 312.4 364.5 416.6 520.7 628.5 733.0										630.0	605
INSTALLED LENGTH L_{inst}	80 100 120 150 180 210 240 270 300 350 400 500 600 700											mm	

Notes:

- 1 Anchor Design Tension Capacities ϕN_A incorporate a strength reduction factor $\phi=0.6$, in accordance with AS3600-2009
- 2 $f'_c = 32 \text{ MPa}$ minimum (For $f'_c > 32 \text{ MPa}$ assume $C_f=1.0$, where C_f =Compressive Strength Factor)
- 3 Capacities based on Grade 500N rebar, in accordance with AS/NZS 4671:2009
- 4 Anchor Design Capacities are based on minimum spacing between anchors of $8 \times d$ and edge distance (tension) of $6 \times d$. Where d = Bar Diameter.
- 5 Base Material Thickness (BMT) must be minimum 150% of anchor embedment when rebars are utilised as anchors. For reinforcing applications, the requirements of AS3600-2009 shall be followed for stress development in reinforcement.

Development Length and Splicing of Reinforcement for Stress Development

- Applications requiring stress development of deformed bars for reinforcing applications, LHS of equation 13.1.2.2 (with $k_1 = 1$, for post-installed bars) and

other relevant clauses of AS3600-2009 shall be considered when deriving the development length. The greater of the development length as per AS3600-2009 (or local code/standard) or length from the above table shall be adopted for design purposes to satisfy the code/standard requirements.

- Splicing of reinforcement shall be in accordance with Clause 13.2 of AS3600-2009 or local code/standard.

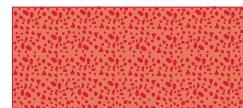
Guide load capacities in masonry walls

The following tables list the characteristic ultimate load capacities for the PURE150-PRO epoxy when tested with class 4.6 threaded rod. The data contained in these tables should be used as a guide since the consistency of masonry base materials varies greatly. Job site tests are advisable to determine actual load capacities.

Characteristic Ultimate load capacities in solid red brick (55MPa)

The following loads are based on tests conducted using threaded rods and mesh screen tubes installed in a multiple wythe wall constructed from solid red brick

ANCHOR SIZE mm	HOLE SIZE mm	EMBEDMENT DEPTH mm	SOLID BRICK	
			TENSION kN	SHEAR kN
M8	10	60	11.8	11.0
M10	12	70	14.2	15.7
M12	14	80	29.9	22.8



Characteristic Ultimate load capacities in grout filled block

The following loads are based on tests conducted using threaded rods installed in a wall constructed from hollow block filled with fine grout. The actual amount of material will vary depending upon job site installation procedures and waste.

ANCHOR SIZE mm	HOLE SIZE mm	EMBEDMENT DEPTH mm	GROUT FILLED BLOCK	
			TENSION kN	SHEAR kN
M8	10	25	8.3	12.5
		50	11.7	
M10	12	40	16.2	16.2
		90	24.9	
M12	14	50	18.6	23.2
		100	34.6	



Block 12MPa,
fine grout 20MPa

Note: Refer to the Adhesive Anchoring Systems Design Manual for masonry design criteria

Design guidelines: **Working stress design**

Divide characteristic ultimate load capacities by a factor of safety of 3.

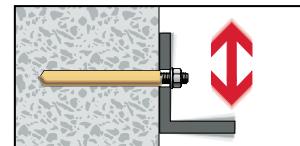
Limit state design

Multiply characteristic ultimate load capacities by $\phi = 0.6$

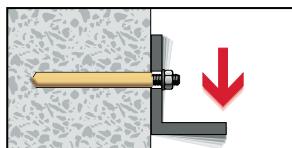
Dynamic loading – anchors for use in seismic design

Dynamic loads and shock loads

Dynamic loads are intermittent and varying loads such as those imposed by a central air conditioning unit, manufacturing machinery, or earthquakes. They are normally alternating or pulsating loads associated with vibration. Shock loads are instantaneous, periodic loads of high intensity such as those applied by an automobile striking a guard rail support or a truck hitting a dock bumper. Standard industry practice with regard to safety factors varies depending upon the frequency and intensity of the load. However, safety factors for dynamic or shock load conditions may be as high as 10:1.



Anchors for use in seismic design



Seismic (Earthquake) design is complex as it considers several influencing factors some of which are: geographic location, soil characteristics, structure classification, structure type, structural system and lateral forces. Design and specification of anchors in accordance with AS1170.4-1993 (Minimum design loads on structures - Earthquake loads) should be conducted by a design professional. Powers Fasteners have tested various epoxy injection systems under seismic conditions as outlined in ICC EVALUATION SERVICE, INC. Report, AC 308: Acceptance Criteria for Post-Installed Adhesive Anchors in Concrete Elements. Procedure outline of seismic testing, including results, available upon request.

Diamond cored holes

Some adhesive systems experience a considerable reduction in performance due to shrinkage during curing thus making them unsuitable for installation in diamond core-drilled holes. The PURE150-PRO epoxy injection system does not experience any shrinkage during curing and performs equally well in both rotary hammer-drilled and diamond core-drilled holes.

Drinking water system components certification

The PURE150-PRO epoxy injection system is certified under NSF/ANSI 61 (Products for use in contact with drinking water.).

Fire resistance

Fire resistance of PURE150-PRO injection system in combination with anchor rods of sizes M8 to M30 in CLASS 5.8 galvanised steel. Fire resistance relates to maximum allowable tension loads for various durations of time in solid reinforced concrete of minimum strength 25MPa.



Designation	Powers PURE150-PRO							
	Fire resistance time t_u (minutes)	Maximum tensile load* F (kN)						
		M8	M10	M12	M16	M20	M24	M30
Minimum set depth (mm)	80	90	110	125	170	210	250	280
30	0.90	3.20	4.20	8.25	17.25	24.85	32.30	39.50
60	0.50	1.80	2.30	5.30	10.20	14.75	19.15	23.40
90	0.30	1.10	1.40	3.80	6.70	9.70	12.60	15.40
120	0.20	0.75	0.90	3.00	5.00	7.20	9.30	11.35

NOTE: For report details please contact Powers Fasteners Technical Department

Use in special applications

Installation of anchors under water

PURE150-PRO epoxy injection adhesive can be used for the installation of threaded anchor rod or reinforcing bars in submerged applications under water provided some installation and design criteria are followed. The anchor holes should be prepared following the standard installation instructions with the following exceptions.

Special care should be taken to clean the anchor hole as a slurry of concrete paste tends to form on the walls of the anchor hole when drilling under water. To inject the epoxy, insert the mixing nozzle to the bottom or rear of the anchor hole. Slowly withdraw the nozzle as the anchor hole is filled to insure that the water is displaced from the hole and that no air pockets are formed. The anchor hole should be filled completely with epoxy prior to inserting the anchor rod.

The setting time of the PURE150-PRO epoxy in submerged applications depends upon the base material temperature as listed in the material properties section.

Laboratory tests and field experience have shown that a decrease of 15 to 20% in the ultimate tension load capacity can be expected for an anchor which is installed under water. The design professional should include this reduction in their calculations.

Installation of anchors overhead

PURE150-PRO epoxy injection adhesive can be used for the installation of threaded anchor rod overhead. Anchor holes should be prepared in accordance with the overhead installation procedure, referenced page 143 in the **Powers Specification Guide**.

Adhesive anchor functioning for removability

Many temporary anchoring applications which require high load capacities, also need to be removable. Adhesive systems often provide the highest load capacities, but have not been easily removable. When using the PURE150-PRO epoxy injection adhesive, Powers has developed a method that has several advantages over those offered by competitive systems. Typically, a removable installation requires the use of a steel insert sleeve. A large hole size is required to accommodate the sleeve. The sleeve is expensive, and it must be left in the concrete which can cause corrosion problems. These problems are easily eliminated when using PURE150-PRO epoxy injection adhesive. By wrapping Teflon pipe tape around the bond area of the threaded anchor rod or bolt prior to inserting it in the anchor hole filled with epoxy, it can easily be removed after the PURE150-PRO epoxy has set, leaving threads formed from epoxy completely intact in the anchor hole. The bolt or rod can be re-threaded into the anchor and still achieve a high load capacity.

Pick proof applications

PURE150-PRO epoxy injection adhesive is commonly used for pick proof applications in prisons and security projects.

Estimating guide

Refer to Powers website, www.powers.com.au, downloads section and under software you can download the latest **Powers Adhesive Volume Calculator**.

Installation instructions

For installation instructions refer to the Adhesive Anchoring Systems Design Manual.

Health and safety

Material safety data sheet available on request. (Ref. Chemwatch report 18-3723 and 18-3724) or via the Powers website.

Suggested specification

PURE150-PRO epoxy injection system
Stud/Re-Bar Size + Length (Specify plating + material grade)
Drill Size (mm)
Embedment Depth (mm)

Contact Powers Fasteners for CAD Specification file.



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